

Claims:

1. Radical for use in a dynamic nuclear polarisation process of a sample wherein the radical is generated in situ from a radical precursor and decomposes to a non-radical species at temperatures from about 5 K to about 273 K.  
5
2. Radical according to claim 1 wherein the radical decomposes to a non-radical species at temperatures from about 50 K to about 253 K.
- 10 3. Radical according to claim 1 to 2 wherein the radical decomposes to a non-radical species at temperatures above about 77 K.
4. Radical according to claims 1 to 3 wherein the radical precursor is a photolabile organic compound or an organic compound comprising a photolabile group and  
15 the radical is generated by photolysis.
5. Radical according to claim 4 wherein the radical precursor is a photolabile organic compound selected from the group consisting of  $R^1-X$ ,  $R^1-S-R^2$ ,  $R^1-Se-R^2$ ,  $R^1-N=N-R^2$ ,  $R^1-O-O-R^2$ ,  $R^1-ONO$ ,  $R^1-OX$  and  $R^1CO-O-O-COR^2$ , wherein  $R^1$  and  $R^2$  are identical or different straight chain or branched alkyl, aryl or aralkyl groups, and X is Cl, Br or I.  
20
6. Radical according to claim 4 wherein the radical precursor is an organic compound comprising a photolabile group, the photolabile group is selected from the group consisting of  $-R^1-X$ ,  $-R^1-S-R^2$ ,  $R^1-S-R^2-$ ,  $-R^1-Se-R^2$ ,  $R^1-Se-R^2-$ ,  $-R^1-N=N-R^2$ ,  $R^1-N=N-R^2-$ ,  $-R^1-O-O-R^2$ ,  $R^1-O-O-R^2-$ ,  $-R^1-ONO$ ,  $-R^1-OX$ ,  $R^1CO-O-O-R^2$ ,  $-R^1CO-O-O-COR^2$  and  $R^1CO-O-O-COR^2-$ , wherein  $R^1$  and  $R^2$  are identical or different straight chain or branched alkyl, aryl or aralkyl groups, and X is Cl, Br or I.  
25
- 30 7. Radical according to claims 4 to 6 wherein  $R^1$  and  $R^2$  are identical.

8. Radical according to claims 4 to 7 wherein the radical precursor is selected from the group consisting of azobisisobutyronitrile, tert.-butyl nitrite, tert.-butyl hypochlorite, dibenzoylperoxide and di-tert.-butylperoxide.
- 5 9. Radical according to claims 4 to 8 wherein the photolysis is carried out at wavelengths in the range of about 200 to 300 nm.
- 10 10. Radical according to claims 1 to 3 wherein the radical precursor is a solvent and the radical is prepared in situ using high-energy radiation.
11. Radical according to claim 10 wherein the radical precursor is selected from the group consisting of water, methanol, 1,2 propanediol, glycol and glycerol.
12. Radical according to claim 10 to 11 wherein the high-energy radiation is X-ray radiation or gamma radiation.
13. Dynamic nuclear polarisation (DNP) of a mixture comprising a sample and a radical, wherein the radical is generated in situ from a radical precursor and decomposes to a non-radical species at temperatures from about 5 K to about 273 K.
14. Dynamic nuclear polarisation according to claim 13 wherein the generation of the radical is carried out outside the DNP magnet and the mixture is transferred into the DNP magnet after the radical generation.
15. Dynamic nuclear polarisation according to claim 14 wherein the radical is generated by photolysis of a mixture frozen in liquid nitrogen, the mixture comprising the sample and a photolabile organic compound or an organic compound comprising a photolabile group.
16. Dynamic nuclear polarisation according to claim 14 wherein the radical is generated by freezing a mixture comprising the sample and a solvent in liquid nitrogen and irradiating the frozen mixture with high-energy radiation.

17. Dynamic nuclear polarisation according to claim 13 to 15 wherein the mixture further comprises a solvent.

18. Dynamic nuclear polarisation according to claims 13 to 16 wherein the mixture  
5 further comprises a glass forming compound.